

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

**Subsystem:** Master Schedule and Overview  
**WBS:** All  
**Date Submitted:** 4/25/00  
**Submitted By:** Mike Tuts, Bill Freeman

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Central Preshower Module Fabrication Complete	12/16/97	12/16/97	0 w
X	M2-Central Preshower Installed on Solenoid	5/21/98	5/21/98	0 w
	M3-Level Ø-South Installed	5/1/00	2/9/00	11.6 w
	M2-Muon End Toroids Installed on Platform	7/17/00	11/15/00	-17 w
	M1-Begin Shield Wall Removal/Ready to Roll-in	11/1/00	11/22/00	-3 w
	M1-Detector Rolled-in and Hooked Up	2/1/01	2/2/01	-0.2 w

Note: the full set of reportable milestones are collected and sorted by date at the end of this report.

## Areas of Concern

### Technical

Refer to the WBS level 3 system reports.

### Schedule

The principal area of schedule concern remains the silicon tracker. We have been reviewing fallback plans to assure ourselves that we will be able to start the run with a viable physics detector. These plans have been presented to the Lab. In particular, "action triggers" for the silicon system have been defined which specify the latest dates at which de-scoping decisions must be made. The present focus is on the delays in the F-disks. An area of increasing concern is the timely availability of tracking electronics. While this is unlikely to affect the detector roll-in (because in many cases it can be added after the detector has rolled-in), it may have an impact on the timely commissioning of the tracker detector subsystems. To date, numerous readout electronics problems are being uncovered and, so far, all appear to have solutions.

As expected, numerous problems continue to crop up, with potential impact on the schedule. At present we still anticipate the full completion of the detector before the start of Run II in March, 2001. We continue to refine the installation schedule to create schedule contingency.

### Resources

No additional resources were requested during this period.

### Cost

A change request was generated to cover the additional costs associate with completing the DØ upgrade detector (see below). Through March we have obligated \$2.9M. We are putting in place forward funding to assure ourselves of uninterrupted obligation authority to keep the project on schedule.

## Change Requests

The review of the estimate-to-complete led to an increase in the cost and contingency for the project. As required by the DØ Project Management Plan, any change in the Total Equipment Cost must be approved by the DOE. A change request, 1-032400-01, was presented to the Lab and DOE. That change request has now been approved by the DOE.

## Progress Summary

All systems are well along in production, including all of the large systems (Silicon, Fibers, Muons) and some have completed detector construction (forward muon pixels). Some of the smaller forward detectors (FPS, ICD and luminosity monitor) have been completed and are being installed. All of this is leading to a significant increase of activity in the DØ assembly hall. Commissioning activities are well underway with all components of the new DAQ system. For more details, see the enclosed subsystem reports.

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

**Subsystem:** Silicon Tracker  
**WBS:** 1.1.1  
**Date Submitted:** 4/24/00  
**Submitted By:** Marcel Demarteau, Ron Lipton

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	H Half-Wedge Fabrication 20% Complete	10/15/99	10/15/99	0 w
X	3 Chip Ladder Fabrication 80% Complete	10/26/99	10/20/99	0.6 w
X	9 Chip Ladder Fabrication 20% Complete	11/4/99	11/3/99	0.2 w
X	F Wedge Assemblies 20% Complete	1/24/00	1/19/00	0.4 w
X	6 Chip Ladder Fabrication 20% Complete	1/31/00	1/3/00	3.9 w
X	H Half-Wedge Fabrication 80% Complete	3/29/00	2/23/00	5 w
	F Wedge Assemblies 80% Complete	5/3/00	4/26/00	1 w
	M2-First Silicon Tracker Barrel/Disk Module Complete	5/9/00	1/24/00	15.2 w
	9 Chip Ladder Fabrication 80% Complete	6/27/00	3/27/00	13 w
	6 Chip Ladder Fabrication 80% Complete	7/12/00	3/14/00	16.8 w
	South Half-Cylinder Complete and Ready to Move to DAB	7/27/00	8/1/00	-0.4 w
	South H-Disks Ready to Move to DAB	8/4/00	7/3/00	4.6 w
	M3-All Silicon Tracker Barrels/Disks Complete	10/27/00	8/25/00	9 w
	North Half-Cylinder Complete and Ready to Move to DAB	10/27/00	9/18/00	6 w
	M1-Central Silicon Complete	10/27/00	9/18/00	6 w
	M2-Silicon Tracker Installed in Solenoid/Fiber Tracker	12/19/00	9/25/00	12 w

## Areas of Concern

### Technical

Concerns are now focussed on testing, repair, and system integration.

- Problems with pedestal jumps and resulting data loss during readout have been solved. Cosmic ray studies are proceeding. The first pass interface board with low mass cables and adapter board has been tested, except for the slow controls and monitoring interface, and is fully functional. The new hardware (interface board, low mass cables, adapter board) needs to be integrated into the 10% and 1% tests for full system testing.
- Assembly of the first barrel is proceeding. Grounding problems were found in the 3-chip ladders which will necessitate some repair work. Overall mechanical tolerances are well controlled during the assembly process. Careful measurement has shown some 3-chip ladders with bowing which exceed our nominal mechanical tolerance. We are considering repair of the worst offenders. Studies show that bows in Z exceeding 100-150 microns could have an effect on our level 2 trigger rate.
- We depend on repair of HDIs and assembled ladders and wedges to maintain an acceptable yield. With our increased rate of production and testing the repairs are falling behind. We have added an HDI repair stand at DAB that has been quite successful in identifying HDI problems. The HDI repair rate is greater than 80%. Ladder and wedge assemblies are more delicate, complex, and time-consuming. We hope that the repair rate of ladder and wedge assembly improves as the team gains experience.

### Schedule

- HDI assembly is a limiting factor in 9-chip ladder production. We have recently received the final beryllium pieces for these parts. The most recent shipment to Promex had problems with bubble formation in the beryllium-HDI lamination. This problem will delay the production of 9-chip short-tail ladders by at least two weeks.
- Micron sensor delivery continues to limit the production rate of 6 chip ladders. Ladders are constructed as soon as sensors are received and tested. Over thirty sensors were delivered in March. We expect deliveries to slow a bit in April due to vacations and holidays. We hope that Micron can deliver the balance of the 90-degree sensor order by the end of June. This will allow us to keep our "split-cylinder" schedule. We continue to have the option to accept detectors with isolation faults. We expect these devices to have a 2-3% increase in noisy channels per ladder. There are more than twenty such devices "on the shelf".
- F- and H- wedge production have resumed with delivery of new HDIs and detectors.

# **DØ Upgrade Monthly Progress Report**

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- Full testing of barrels and disks with the final readout system awaits delivery of the second pass interface card. The time needed for assembly and testing of these devices will determine the date for the beginning of tests with a full barrel/disk and associated electronics and cooling.

## **Resources**

Technician and physicist resources are being stretched with simultaneous ladder/wedge production, barrel assembly, disk assembly, and the 10% test. We have moved some technicians from ladder and wedge production to barrel assembly. This will be a problem when we again receive new HDIs for ladder construction. We will have to prioritize technician resources carefully in the next few months to assure that the highest priority parts are assembled and tested. We continue to integrate new physicist manpower into production and testing operations. Our most pressing needs are in the electronics area, with increasing emphasis on system integration and component repair. The physicist/engineer who has been maintaining our test stand and testing the interface card will return to Russia in a month.

## **Cost**

There are no new major cost items. There is some concern that more HDIs (~\$6,000) will be needed to replace the parts that may have been lost to bubbling at Promex. There is continuing exposure on parts not yet received, primarily detectors from Micron and Eurysis, and low-mass cables. Our largest uncommitted item is the interface card system. This appears to be proceeding without major problems that would increase the overall cost.

## **Change Requests**

None

## **Progress Summary**

Our overall progress has been satisfactory in March with the following items:

- Barrel assembly has begun. Our initial installation rate has been slow, with each detector measured and tested immediately after installation. An installation rate of seven ladders per day appears to be realistic. No major mechanical problems were encountered. Some grounding problems need to be addressed.
- H full-wedge production (from half-wedges) has begun and is progressing well. H-disk assembly will begin in April.
- The prototype F-disk "14<sup>th</sup>" ring was assembled using b and c grade detectors and HDIs. Assembly techniques were developed and devices were electrically tested. Assembly of the first ring awaits operational readiness clearance approval by PPD.
- Problems found during the cosmic-ray phase of the 10% test were solved. Cosmic data taking will restart and we expect to have parts for the final readout system in May.
- The ladder/wedge production and testing operation is going well. The production rate of all ladder/wedge types is limited by the availability of parts. We expect to have all the needed HDIs and detectors in hand by the end of June, with a large fraction arriving in May. We are confident that we can produce and test assemblies at the rate needed to make our schedule.
- We have developed effective HDI repair techniques. We continue to work on improving our yields for the more complex ladders and wedges.

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

**Subsystem:** Fiber Tracker and VLPCs  
**WBS:** 1.1.2  
**Date Submitted:** 4/25/00  
**Submitted By:** Alan D. Bross

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	<i>Detector</i>			
X	M2 - Assembly Design Complete	3/5/99	3/5/99	0 w
X	M2-First Cylinder Complete	9/2/99	9/2/99	0 w
X	M3-Fiber Tracker Ribbon Fabrication 50% Complete	11/5/99	11/12/99	-0.9 w
X	M2-Fiber Tracker Assembly Begun	2/1/00	12/6/99	6.2 w
X	M3-Fiber Tracker Cylinders 8, 7, 6, and 5 Complete	3/2/00	1/28/00	5 w
	Waveguide Production 50% Complete	3/16/00	1/29/00	6.8 w
	M3-Fiber Tracker Ribbon Fabrication Complete	4/24/00	3/6/00	7.1 w
	M3-Fiber Tracker Ribbon Mounting Complete	5/15/00	4/20/00	3.5 w
	M2-Fiber Tracker Assembly Complete	5/25/00	5/4/00	3.1 w
	M3-Waveguide Production Complete	8/2/00	6/5/00	8.4 w
	<i>VLPCs</i>			
X	M2-VLPC Production 50% Complete	8/31/97	8/31/97	0 w
	M3-VLPC Cassette Assembly 50% Complete	6/5/00	4/12/00	7.4 w
	M3-VLPC Cryo System Operational	7/7/00	6/12/00	3.6 w
	M3-VLPC Cassette Assembly Complete	10/13/00	8/22/00	7.4 w

## Areas of Concern

### Technical

None

### Schedule

None

### Resources

None

### Cost

None

## Change Requests

None

## Progress Summary

- Ribbon mounting is complete on cylinders 4 through 8.
- Cylinders 8, 7, and 6 have been nested.
- Flex circuit production deliveries have started.
- Production cassettes 1 through 4 are complete.

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

**Subsystem:** Forward Preshower  
**WBS:** 1.1.4  
**Date Submitted:** 4/11/00  
**Submitted By:** Abid Patwa

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Forward Preshower Module Fabrication Begun	11/4/98	11/4/98	0 w
X	M3-1st Forward Preshower Detector Complete	2/24/00	1/12/00	6.2 w
X	Module Fabrication and Testing Complete	4/1/00	12/10/99	14 w
X	M3-2nd Forward Preshower Detector Complete	4/3/00	3/8/00	3.6 w

## Areas of Concern

### Technical

None

### Schedule

Both FPS detectors will be installed and aligned at DØ during mid-to-late April, 2000. The installation is to be coordinated with both the Inter Cryostat detectors (ICD) and Level 0-Luminosity Monitors (LM) that mount and anchor to the FPS at the detector's outer and inner radius, respectively.

### Resources

None

### Cost

None

## Change Requests

None

## Progress Summary

- The 2<sup>nd</sup> detector (FPS-North) was completed, assembled, and aligned on the vertically mounted spherical EC shaped dome at BNL during the first week of April. Both detectors are therefore complete.
- An additional spare module was cabled, inspected and certified.
- A collection of new retro-reflective coated (V-star System) survey targets were individually placed on all modules that comprise the south and north FPS. These new targets are expected to reduce surveying time considerably during the installation period at DØ.
- Strain-relieved packaging crates for delivery of individual elements of the detectors (i.e. cabled modules, lead absorber units, support elements and rings) were constructed.
- The detectors will be driven from Brookhaven to Fermilab during the 2<sup>nd</sup> week of April with installation to begin a week thereafter.
- Precision inner mounting hardware that supports the FPS and registers the detector's position on the EC head with respect to the beamline (as well as the position of ICD, LM) was completed at Columbia (Nevis Lab) and delivered to Fermilab.
- The Stony Brook shop completed machining of outer mounting support brackets for FPS Layer 1. The remaining elements for Layer 2 are expected to be finished by the 2<sup>nd</sup> week of April.
- A prototype 15-m FPS clear waveguide was made at Indiana University and initial light yield tests with the final connector-ends were studied. An initial staging of the FPS cable routing plan on the EC head to the platform will be done with this waveguide after completion of the detector installation, in order to understand the fiber lengths, clearance and/or constraints that must be respected.

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

**Subsystem:** Tracking Electronics  
**WBS:** 1.1.5  
**Date Submitted:** 4/21/00  
**Submitted By:** Marvin Johnson

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	First Readout Crate Installed & Working	11/16/99	12/2/99	-2 w
	Multichip Modules Received	6/1/00	2/23/00	14 w
	Ten 8-chip Analog Boards Available	6/8/00	4/19/00	7 w
	10 Digital Boards Available	8/11/00	3/22/00	20 w
	Mixer Boards Ready	10/6/00	6/22/00	14.8 w

## Areas of Concern

### Technical

None

### Schedule

None

### Resources

None

### Cost

None

## Change Requests

None

## Progress Summary

- Except for the sequencer controller and a few of the sequencer power supplies, all components for the silicon system are here. All of the received items are at least partially tested and most are completely tested.
- All rack preparation in the movable counting house is complete except for one rack where we have agreed to exchange it with a level 3 readout rack. Materials for the platform rack preparation are here and this should be completed in April.
- We have successfully read out two crates through Level 3. We plan to read out half the crates in the next few weeks as Level 3 components arrive.
- The analog front-end (AFE) prototype board has arrived and operational testing has commenced. The 8-MCM AFE board is in layout and proceeding on schedule. Work on the schematic level design of the 12-MCM is finished and is being checked. Meanwhile the layout has begun.
- First article production on the MCM was delayed due to problems at the vendor that are now resolved.
- The digital board tests included tests of the link to the Muon Level 1 and the G-link to VRB. Tracks were found and track lists were output with the production firmware. Production will commence.

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

**Subsystem:** Calorimeter Electronics  
**WBS:** 1.2.1  
**Date Submitted:** 4/21/00  
**Submitted By:** Mike Tuts

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	SCA Testing Complete	11/23/99	12/15/99	-2.8 w
X	Shaper Hybrid 50% Complete	2/22/00	5/9/00	-11.05 w
	M2-Calorimeter Preamp System Test Complete	5/31/00	3/31/00	8.4 w
	M3-Calorimeter CC,ECN Preamp Installation Complete	6/7/00	3/31/00	9.4 w
	Timing System Installed	8/18/00	8/18/00	0 w
	Daughterboard Vendor Production Complete	10/25/00	6/16/00	18.2 w
	BLS Motherboard Assembly Complete	12/1/00	8/7/00	16.2 w
	M2-Calorimeter BLS Assembly Complete	1/18/01	9/26/00	15.2 w

## Areas of Concern

### Technical

The major potential technical risks are those associated with system aspects. Assuring ourselves that we achieve the required system noise performance will be the focus of the next few months. Presently there is some additional noise associated with the BLS system boards and some issues with the calibration system. They are under study.

### Schedule

We have missed the M2 milestone "Calorimeter Preamp System Test Complete". There are two principal reasons for this delay. The first is that the preamp box cooling rework has turned out to be more complex than originally anticipated. So although we have all the components in hand to populate the preamp system (preamps and preamp power supplies), we are reluctant to install and test them in their final positions because the cooling rework would eventually necessitate their removal while the work is underway. The second reason is that a number of problems were uncovered during the safety review. These have been rectified, but caused delays. The preamp system is far from critical path for the detector, and hence missing the milestone will not affect the overall detector schedule.

We are also incurring additional delays in the BLS system due to the need for unanticipated additional prototype cycles of the BLS motherboard.

### Resources

As we develop a better understanding of the effort required to rework the preamp box cooling system based on our installation of a prototype, we anticipate the need for additional technician manpower to achieve this in a timely manner. Presently we estimate the need for an additional ten man-weeks of technician help; we will refine this estimate as our understanding develops.

### Cost

The estimate to complete for the DØ detector was reviewed on March 16, 2000 by a panel chaired by John Cooper of the PPD. The review committee concurred with our cost estimate, but raised the contingency by \$67k to cover the BLS work. The new costs and contingency increases have been submitted to the Lab and DOE for approval.

## Change Requests

We are preparing a schedule change request for the M2 milestone that will be missed. The reasons for the delay are attributable to preamp box cooling rework and safety issues discussed above.

# **DØ Upgrade Monthly Progress Report**

for the month of March, 2000

## **Progress Summary**

- All 60,000 preamps are now in hand.
- About 900 (of 1250) preamp motherboards have been populated and tested.
- 500 pre-production BLS daughtercards have been produced and are presently being assembled.
- Two prototype BLS power supplies have been built and tested.
- The BLS power supply transformer order has been released for production.
- We have completed the final tests of the last batch of SCA's that were packaged. The yields were sufficient that we do not anticipate the need to purchase more devices from SuperTech (although they have about a dozen wafers that could be purchased).
- We continue to work with the online, controls and commissioning group to bring up the DAQ and required controls for our infrastructure
- We are testing calibration system power supplies.
- We have obtained Operational Readiness Clearance to run the preamp and calibration system.
- We are preparing the documentation for the BLS system safety review



# DØ Upgrade Monthly Progress Report

for the month of March, 2000

**Subsystem:** Intercryostat Detector  
**WBS:** 1.2.2  
**Date Submitted:** 4/25/00  
**Submitted By:** Andy White

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M3-ICD Tile Modules/Boxes Ready	4/19/00	1/18/00	13.2 w
X	M2-ICD Modules Arrive at Fermilab	4/24/00	1/25/00	12.8 w
	M3-InterCryostat Detectors Installed	5/8/00	2/1/00	13.8 w
	Drawers Ready	7/21/00	12/14/99	29.2 w

## Areas of Concern

### Technical

A prototype solution for our fiber cables has been developed; production development remains to be done.

### Schedule

- Waiting for light mixing boxes (LMBs) from muon for calibration
- Need to develop a detailed installation schedule for backplanes and fiber cables.

### Resources

None

### Cost

Fiber cables cost still unknown.

## Change Requests

None

## Progress Summary

- Finishing the testing of the last few supertiles – ready for April delivery to Fermilab.
- Started setup for backplane fabrication.
- Developed detailed supertile installation schedule with FPS.
- Developed detailed specifications for additional cable chutes.
- Motherboards are in production.

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

**Subsystem:** Muon Central  
**WBS:** 1.3.2  
**Date Submitted:** 4/1/00  
**Submitted By:** Tom Diehl

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	PDT Commissioning Complete	10/17/00	6/9/00	18 w
	CFA Commissioning Complete	11/1/00	7/10/00	16.3 w

## Areas of Concern

### Technical

- Progress has slowed on the two central-muon gas systems. Much of the gas piping has been installed on the detector. However, there are no connections to the muon gas room, where the pumps and filters do the work of supplying the gas.
- We continue to be limited in the number of operating WAMUS PDTs because of the lack of final version Control Boards. The reason for the delay is that the electronics engineer, being very knowledgeable and capable, is required to help the other engineers solve problems with their boards. In particular, he spent two weeks in the past month improving the Muon Fanout Card design so the next installment of boards can be purchased. We expect to overcome this delay in the next four weeks. By the end of the month we hope to be operating six of the ninety-four PDTs.
- We are also limited in the number of Cosmic Cap and Bottom scintillation counters that can be commissioned because of the short supply of Scintillator Control Cards (SRCs). There are only three available to be shared among the electronics engineers, control-software programmers, and detector commissioners. The result is that we are limited to commissioning one crate of electronics.

### Schedule

The CFA counter commissioning schedule continues to slip because there are no physicists working on it.

### Resources

The small number of physicists available for commissioning the three detector systems remains a concern, although the situation has improved since last month when only 2.4 physicists, including no post-docs, were available. This month the number has improved to 3.9 physicists.

### Cost

None

## Change Requests

None

## Progress Summary

- Installation of the A- $\phi$  counter LED-pulser calibration system was finished. Testing continued.
- The Run II data acquisition system and Level 1 trigger system were used to readout, for the first time, scintillation counters in the Cosmic Cap. The Level 1 trigger was formed from hits in the counters. Sixteen channels were readout.

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

**Subsystem:** Muon Forward Trigger Detectors  
**WBS:** 1.3.3  
**Date Submitted:** 4/7/00  
**Submitted By:** Dmitri Denisov

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Muon Forward Trigger Counter Assembly 10% Complete	10/12/98	10/12/98	0 w
X	All Pixel Octants Assembled	2/23/00	4/4/00	-5.8 w
	All Muon Forward Trigger Detector Planes Installed	11/27/00	8/25/00	12.6 w

## Areas of Concern

### Technical

None

### Schedule

Installation of A-layer pixel octants, originally planned for early May, will be delayed somewhat due to the absence of support designs.

### Resources

The lack of availability of engineering resources to complete the designs needed for pixel installation is limiting our progress. Engineers who were designated to work on these designs were diverted to more critical tasks that were not in the original schedule, such as shielding re-design. Safety reviews have also taken up a non-negligible amount of their time recently. As a result, the forward trigger detectors support design is not yet done. The resulting delay in A-layer installation is about two or three weeks.

### Cost

None.

## Change Requests

A set of cost change requests has been submitted in response to the PPD/Fermilab review of the revised DØ cost-to-complete.

## Progress Summary

- Assembly and tests of all pixel octants is complete. Long-term studies demonstrate no reliability problems.
- Installation and commissioning of the high-voltage system and readout system at DØ has started.
- Design of the transportation/installation fixture for A-layer octants was finished.

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

**Subsystem:** Muon Forward Tracker  
**WBS:** 1.3.4  
**Date Submitted:** 4/7/00  
**Submitted By:** Dmitri Denisov

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Muon Forward Tracker MDT Assembly 10% Complete	1/29/99	1/29/99	0 w
X	Arrival Of C-Layer MDT Modules At FNAL	11/3/99	10/22/99	1.7 w
X	M2-All Muon Forward Tracker MDT Modules At Fermilab	3/30/00	3/10/00	2.8 w
	B-Layer Octants Assembled	7/14/00	4/18/00	12.2 w
	All MDT Octants Assembled	7/14/00	7/14/00	0 w
	Muon Forward Tracker B-Layer Planes Installed	11/2/00	6/15/00	19.6 w
	All MDT Planes Installed	11/2/00	8/4/00	12.6 w

## Areas of Concern

### Technical

Mini-drift tube amplifier noise is about a factor of two above our baseline goal. While the forward muon tracker could run with a higher noise level, we are studying the possibilities for reducing pick-up noise.

### Schedule

The arrival of parts for the C-layer MDT octants slipped about two weeks. Together with lack of drawings for MDT octant assembly and assembly fixtures, this has delayed the planned startup of C-layer MDT octant assembly by a corresponding amount. The rate of MDT assembly operations at Lab F is less than planned. This will cause a schedule slippage that depends upon the resources allocated (see below).

### Resources

Lack of engineers and drafters working on the project is the key reason for subproject delays. Fewer Fermilab technicians at Lab F than originally planned (currently 7 instead of 12) does not permit us to run Lab F operations according to our original schedule.

### Cost

None.

## Change Requests

A set of cost change requests has been submitted in response to the PPD/Fermilab review of the revised DØ cost-to-complete.

## Progress Summary

- Tests of all A-layer MDT octants have finished.
- Eight north A-layer octants have been transported from Lab F to DØ and are ready for installation.
- All B-layer tubes have arrived at Fermilab, satisfying this Director's milestone.
- All C-layer tubes have been pre-tested and are ready for octant assembly.
- C-layer honeycomb panels that are within our flatness specifications have been delivered from industry.
- The C-layer octant design has finished, and all C-layer octant parts were procured.

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

**Subsystem:** Muon Electronics  
**WBS:** 1.3.5  
**Date Submitted:** 4/17/00  
**Submitted By:** Boris Baldin

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	MDT ADB Fabrication Complete	12/2/99	12/2/99	0 w
X	MDC Fabrication Complete	1/31/00	12/13/99	5 w
X	M2-Muon Electronics Preproduction Installation Complete	1/31/00	12/13/99	5 w
X	FEB, CB Production Complete	4/10/00	1/3/00	14 w
	MRC, MFC Production Complete	5/24/00	3/27/00	8.4 w
	SFE, SRC Fabrication Complete	5/30/00	2/3/00	16.5 w

## Areas of Concern

### Technical

None

### Schedule

- Scintillator Front End board (SFE) production has been delayed by the stuffing vendor. Estimated completion is currently near the end of May, 2000.
- Muon fanout Card (MFC) production has been delayed due to design problems. Pre-production of nine pieces is expected to be completed in mid-May, 2000.

### Resources

None

### Cost

None

## Change Requests

None

## Progress Summary

Major Muon Electronics projects are either in production or production complete stages, except for the MFC and SLP.

- Front End Board (FEB) production is complete.
- Muon Readout Controller (MRC) production is complete.
- Scintillator Readout Card (SRC) production is complete.

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

**Subsystem:** Trigger  
**WBS:** 1.4.1-1.4.5  
**Date Submitted:** April 17, 2000  
**Submitted By:** Gerald C. Blazey and Nikos Varelas

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	SLICs Received	12/10/99	11/10/99	4 w
X	M3-Establish Single Crate Internal Data Movement	2/17/00	1/6/00	6 w
	M3- Cal Readout Available to L2	4/5/00	2/11/00	7.6 w
	Preproduction MTCxx, MTFB, and MTCM Complete	5/1/00	1/24/00	14 w
	Alpha Cards Received	5/15/00	5/15/00	0 w
	MBTs Received	5/18/00	3/16/00	9 w
	M3-L3 Operational (One Full Chain)	6/29/00	6/1/00	4 w
	Global Installation Complete	7/21/00	7/12/00	1.4 w
	L2 Muon Installation Complete	7/31/00	7/26/00	0.6 w
	L2 CTT Installation Complete	8/7/00	8/9/00	-0.4 w
	L2 Cal Installation Complete	9/5/00	8/21/00	2 w
	M3-Muon Level 1 Trigger Preproduction Testing Complete	9/20/00	4/18/00	21.6 w
	M3-Trigger Level 2 Commissioned	10/3/00	9/21/00	1.6 w
	Production MTCxx, MTFB, and MTCM Complete	10/5/00	6/27/00	14 w

## Areas of Concern

### Technical

The 8-MCM ( multi-chip module) channel-to-channel noise variation remains a concern.

### Schedule

The Level 1 calorimeter trigger schedule is under review and is expected to be delayed significantly in favor of completing the framework commissioning. There is also concern that the final delivery date of the Level 2 Alpha boards will slip due to the Level 3 cache problem encountered.

### Resources

An engineer is needed to help with the commissioning phase of the Level 2 system.

### Cost

No changes in WBS 1.4 are expected.

## Change Requests

None

## Progress Summary

### Framework

- All components of the Level 1 and Level 2 frameworks were fully installed.
- The frameworks were tested and commissioned; both can support routine use.

### Level Ø

The focus was on preparations for the upcoming beam diagnostics tests with recycled Run 1 Level Ø equipment.

### Level 1

- No progress was made on Level 1 calorimeter trigger as engineering support was dedicated to commissioning of the frameworks.

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

- Testing continued on nearly all of the Level 1 muon preproduction modules. Loop tests between various components were performed. Work continued on commissioning a Level 1 muon crate, the C++ simulation, and the SLIC tester card.
- Design and prototyping of the Level 1 Central Track Trigger (CTT) hardware continued. An analog front-end (AFE) prototype arrived. The 8-MCM AFE board is in layout and the 12-MCM schematic work has been completed.
- Work on the mixer continued. The digital links have been verified and tracks actually found from test vectors. Work was also preformed on the design of the VHDL code for the DFEs, collectors, and broadcasters.

## *Level 2*

- All SLIC modules (twenty motherboards and ninety-six DSP daughter-boards) are now tested and working.
- The CIC pre-production prototype was tested at DØ utilizing the muon front-end electronics and exercising the full signal path. A slight cross-talk of the CIC board was observed which requires a rework of the grounding plane.
- The pre-production SFO passed a series of tests at Nevis and the University of Nebraska.
- The FICs were fixed to correctly communicate with the VTM serial link.
- The Level 2 rack power monitoring/handling circuitry is designed and being built.
- Work on the Level 2 silicon track trigger (STT) continued.

## *Level 3*

- The Level 3/DAQ group provided readout of the detector to meet a March commissioning milestone.
- Software for the VRC, SB, and ETG was developed, and work continued on the hardware design.
- Work on the pre-production Alphas showed a subtle Level 3 cache problem. We were unable to boot Linux and/or compile the Linux kernel with the Level 3 cache enabled. A subset of roughly ten bits was identified which show up as single-bit (correctable) ECC errors. There is currently an effort underway to understand the ways in which those lines differ from the ones that do not have problems. We are also studying the effect of running without the Level 3 cache enabled. A MBT pre-production prototype is being stuffed and should be available by the end of April. Significant progress was made on the Level 1/Level 2 simulation framework.

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

**Subsystem:** Online  
**WBS:** 1.5.1  
**Date Submitted:** 4/24/00  
**Submitted By:** Stuart Fuess

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	Steady DAQ Running	3/17/00	3/31/00	-2.0 w

## Areas of Concern

### Technical

None

### Schedule

None

### Personnel

None

### Cost

None

## Change Requests

None

## Progress Summary

Activity in March was centered on the March 31<sup>st</sup> Online milestone and a March 15<sup>th</sup> Commissioning milestone. The focus of these milestones was an “available” DAQ system for commissioning needs. A workshop with approximately 30 attendees from the Online and various detector groups was held on March 17, 2000. The workshop was very successful, achieving the goal of integrated simultaneous readout of several detector components, triggered by cosmic rays, controlled by the Level 1 Trigger Framework, and with data written to tape in the Feynman Computing Center. The Online system was a valuable and stable tool during this commissioning effort. We have proclaimed that the functionality as defined in the March 31, 2000 Online milestone was provided during the commissioning workshop, and hence the milestone was achieved two weeks early.

Online DAQ shifts have been staffed by Online group members since late February, 2000. We supply complete DAQ support for these 9AM to 5PM, Monday through Friday shifts. Data is logged on each shift in order to verify the continuing operation of the entire system. The principal purpose of the shifts, however, is to support the activities of commissioning of the detector elements. In March this included the central muon system, the muon scintillator system, and the calorimeter.

Specific activities:

- Organization of the DAQ operational software environment, including establishment of a “products” directory within which code is released and applications are executed. Documentation is maintained in the same directory structure.
- Commissioning of the software system in which event data files created by the Data Logger application(s) are transferred to the Offline SAM storage management system and written directly to tape in the Feynman Computing Center.
- Coordination of the DAQ functions from the COOR application, including detector configuration and resource management, control of the Level 1 and Level 3 triggers, control of routing, streaming, and logging applications, and complete run control.



# **DØ Upgrade Monthly Progress Report**

for the month of March, 2000

## **March '00 Financial Summary**

The month of March fiscal year 2000 closed with obligations for the DØ Upgrade Project totaling \$2,856K on equipment M&S funds and \$38K on Solenoid AIP Plant funds. The current spending plan, which now shows that spending is equal to plan for FY00, has been downloaded from the current Project schedule. Because the latest version of the Upgrade Project Cost Estimate still needs to be loaded into the Project's schedule, the probability for changes to this spending plan is high. The Project was allocated an M&S budget of \$3,104K during November. To cover Operating expenditures, the M&S budget was reduced by \$400K and an additional \$200K reduction is expected during April. DØ expects to spend the full FY00 budget, which is now \$2,504K. In addition to the Project's DoE funding, forward funding will be instituted to cover expenditures beyond the current fiscal year budget. The remaining DoE funding of \$1,020K will be allocated during fiscal year 2001.

The M&S Upgrade Project balance is currently \$4,688K, excluding contributions and contingency. Contributions to the Upgrade currently total \$1,442K. These contributions reduce the M&S balance. DØ Upgrade Spokespersons are in the process of negotiating additional contributions of approximately \$327K, but at this time, these funds are still unspecified. A new Cost Estimate is now being used in the determination of Project's estimate to complete (ETC), which, at this time, is equal to the Project's M&S balance. The overall cost of the Project has increased. A contingency estimate was developed as a result of a PPD Cost Review, which took place during March. The contingency, which will be held by the Directorate, further increases the total Project cost.

The balance in AIP funds is \$281.5K. Once the Solenoid Project is complete, the unobligated AIP balance will be transferred to Upgrade M&S Equipment as budget dollars to be spent in either FY00 or FY01. The Solenoid Project is expected to close prior to the end of May FY00.

The Project currently has commitments with universities and other institutions in the DØ Collaboration, via active Memoranda of Understanding (MoU), totaling \$8,844K. These funds represent an obligation on the part of the DØ Upgrade Project and are regularly costed each month via invoices received from these institutions as work is completed. In addition, several institutions have made significant contributions to the DØ Upgrade. A list of the universities and other institutions involved as well as a more detailed breakdown of the commitments and costs follows.

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

## FY00 Financial Report as of 3/31/00

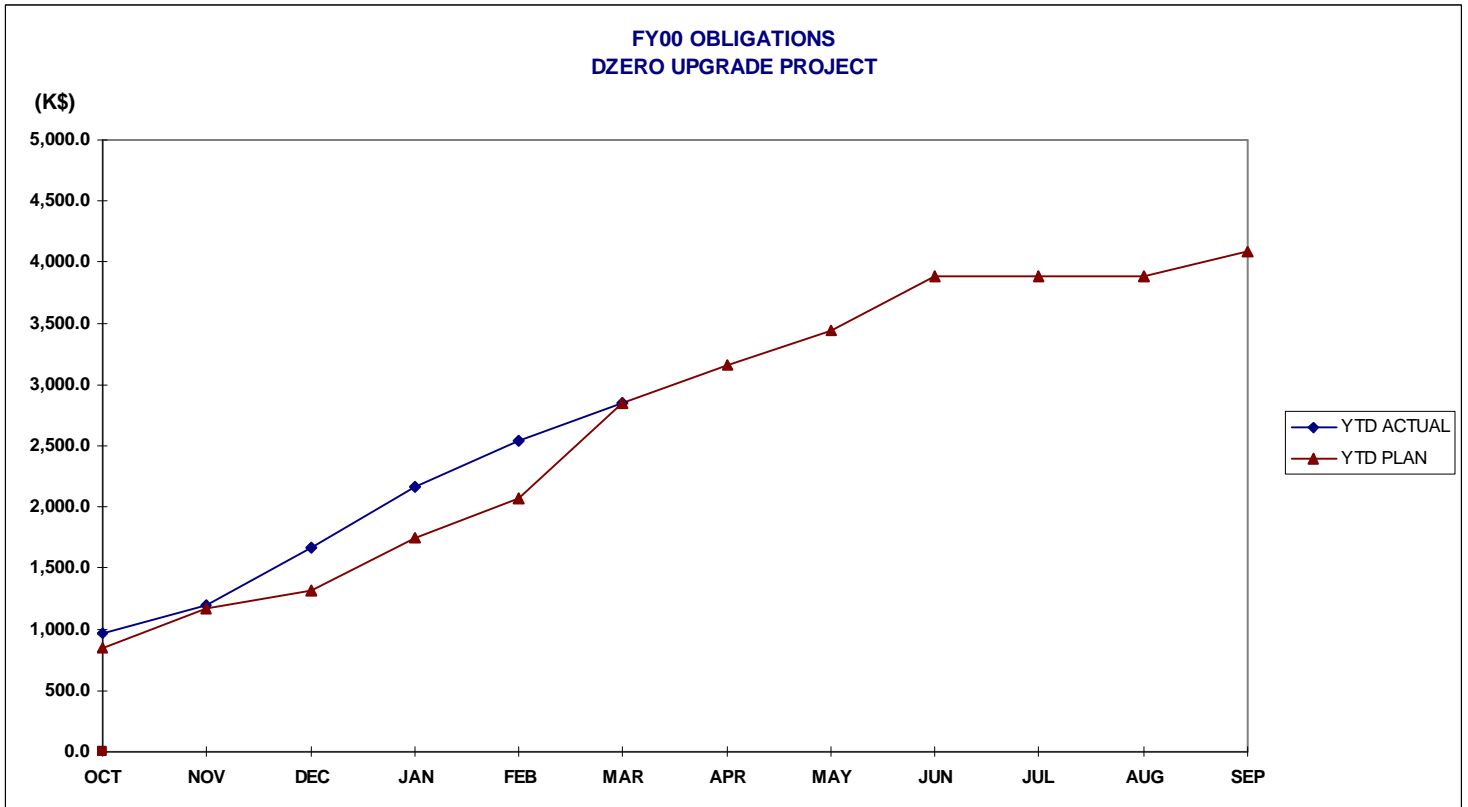
	<u>COST</u> <u>ESTIMATE</u>	<u>PRIOR YR</u> <u>OBLIG</u>	<u>FY 00</u> <u>YTD OBLIG</u>	<u>PROJECT</u> <u>BALANCE</u>
1 TOTAL DZERO UPGRADE PROJECT	41,522.5	33,978.7	2,855.8	4,687.9
1.1 TRACKING DETECTORS	20,032.0	16,773.0	2,045.3	1,213.6
1.1.1 SILICON TRACKER	7,857.1	6,166.1	1,039.0	651.9
1.1.2 FIBER TRACKER	7,708.7	6,976.3	589.9	142.5
1.1.3 CENTRAL PRESHOWER DETECTOR	238.2	228.2	0.0	10.0
1.1.4 FORWARD PRESHOWER DETECTOR	524.3	500.3	13.9	10.1
1.1.5 TRACKING ELECTRONICS	3,703.7	2,902.1	402.5	399.1
1.2 CALORIMETER	4,656.8	4,163.4	63.2	430.3
1.2.1 FRONT-END ELECTRONICS	4,347.6	3,915.5	58.9	373.2
1.2.2 INTERCRYSTAT DETECTOR	309.2	247.9	4.3	57.1
1.3 MUON DETECTORS	9,478.2	7,829.4	565.8	1,082.9
1.3.1 COSMIC RAY SCINTILLATOR	1,223.2	963.2	0.0	260.0
1.3.2 CENTRAL TRIGGER DETECTORS	951.9	713.6	58.2	180.1
1.3.3 FORWARD TRIGGER DETECTOR	2,133.3	1,673.1	26.3	433.9
1.3.4 FORWARD TRACKING DETECTOR	1,410.8	943.4	331.3	136.1
1.3.5 FRONT-END ELECTRONICS	3,759.0	3,536.2	150.0	72.8
1.4 TRIGGER	6,609.5	4,919.5	58.0	1,632.0
1.4.1 FRAMEWORK	1,859.4	1,859.4	0.0	0.0
1.4.2 LEVEL 0	136.4	124.2	6.1	6.1
1.4.3 LEVEL 1	1,502.6	1,120.0	52.0	330.7
1.4.4 LEVEL 2	2,047.1	1,002.3	0.0	1,044.8
1.4.5 LEVEL 3	1,064.0	813.7	0.0	250.4
1.5 ONLINE EQUIPMENT	746.0	293.4	123.5	329.1
1.5.1 ON-LINE EQUIPMENT	746.0	293.4	123.5	329.1
<hr/>				
3.1 TOTAL SOLENOID PROJECT	5,168.0	4,848.2	38.2	281.5
3.1.1 SOLENOID	5,168.0	4,848.2	38.2	281.5

### DEFINITION OF TERMS:

Funds:	DØ Upgrade = M&S Equipment Funds; Solenoid = AIP Plant Funds.
Cost Estimate:	Total Project and Sub-Project Budgets without contingency.
Prior Year Obligations:	Obligations for fiscal years '92 through '99 as applicable.
FY 00 Year-to-Date Obligations:	Obligations for fiscal year '00.
Project Balance:	Cost Estimate - (Prior Year Obligations + Fiscal 00 YTD Obligations)
DØ FY 00 Plan:	The M&S funds allocated to the Project/Sub-Projects as extracted from the current schedule.
DØ FY 00 Balance:	DØ FY 00 Plan - FY 00 Year-to-Date Obligations

# DØ Upgrade Monthly Progress Report

for the month of March, 2000



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
YTD ACTUAL	962.6	1,199.8	1,664.6	2,169.3	2,546.1	2,855.8						
YTD PLAN	843.0	1,164.0	1,316.0	1,754.0	2,076.0	2,845.0	3,158.0	3,439.0	3,884.0	3,884.0	3,884.0	4,086.0

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

## Active MOUs as of 3/31/00

<u>INSTITUTION</u>	<u>EQUIPMENT</u>	<u>R&amp;D</u>	<u>COSTED</u>
Boston University	298,200	5,200	35,093
Brookhaven National Laboratory	236,439		154,630
Brown University	820,076	106,000	161,319
California State University, Fresno	26,160		4,083
Columbia University, Nevis Labs	140,000		107,937
DAPNIA / Saclay	0	0	0
IN2P3	0	0	0
Indiana University	65,000		31,585
Institute for High Energy Physics (IHEP)	404,512	15,000	228,414
Joint Institute for Nuclear Research (JINR)	1,395,286	22,000	1,417,196
Kansas State University	298,620	100,012	261,338
Louisiana Tech University	80,854		52,428
Michigan State University	1,182,387		1,025,044
Moscow State University	261,050		237,800
NIKHEF / Amsterdam	0	0	0
Northern Illinois University	133,000	18,000	103,600
SUNY at Stony Brook	1,105,750	20,000	483,123
University of Arizona	820,598	78,100	446,906
University of Calif, Davis		9,720	0
University of Calif, Irvine	28,468		28,468
University of Calif, Riverside	84,310		84,310
University of IL, Chicago	129,103	22,000	91,042
University of Kansas, Center for Research, Inc.	16,000		833
University of Maryland	221,000		221,000
University of Michigan	167,897		167,897
University of Nebraska, Lincoln	39,708		39,708
University of Notre Dame	190,500	77,000	55,774
University of Oklahoma	43,000		30,085
University of Texas, Arlington	126,764		93,258
<u>University of Washington</u>	<u>50,640</u>	<u>5,250</u>	<u>38,538</u>
 Total Fermilab Funds:	 <u>\$8,365,322</u>	 <u>\$478,282</u>	
 Total Costed:	 5,343,156	 258,252	 <u>\$5,601,408</u>
 Total Open Commitments:	 <u>\$3,022,166</u>	 <u>\$220,030</u>	

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

## Reportable Milestones Summary

<u>Done</u>	<u>Reportable Milestones</u>	<u>Project</u>	<u>Date</u>	<u>Baseline</u>	<u>Var.</u>
X	M1-Solenoid Delivered to Fermilab	Solenoid	5/12/97	5/12/97	0 w
X	M2-VLPC Production 50% Complete	VLPCs	8/31/97	8/31/97	0 w
X	M2-Central Preshower Module Fabrication Complete	Central Preshower	12/16/97	12/16/97	0 w
X	M2-Central Preshower Installed on Solenoid	Central Preshower	5/21/98	5/21/98	0 w
X	M1-Solenoid Installed and Tested	Solenoid	9/30/98	9/30/98	0 w
X	M2-Muon Forward Trigger Counter Assembly 10% Complete	Muon Forward Trigger	10/12/98	10/12/98	0 w
X	M2-Forward Preshower Module Fabrication Begun	Forward Preshower	11/4/98	11/4/98	0 w
X	M2-Muon Forward Tracker MDT Assembly 10% Complete	Muon Forward Tracker	1/29/99	1/29/99	0 w
X	M2 - Assembly Design Complete	Fiber Tracker	3/5/99	3/5/99	0 w
X	M2-First Cylinder Complete	Fiber Tracker	9/2/99	9/2/99	0 w
X	H Half-Wedge Fabrication 20% Complete	Silicon Tracker	10/15/99	10/15/99	0 w
X	3 Chip Ladder Fabrication 80% Complete	Silicon Tracker	10/26/99	10/20/99	0.6 w
X	Arrival Of C-Layer MDT Modules At FNAL	Muon Forward Tracker	11/3/99	10/22/99	1.7 w
X	9 Chip Ladder Fabrication 20% Complete	Silicon Tracker	11/4/99	11/3/99	0.2 w
X	M3-Fiber Tracker Ribbon Fabrication 50% Complete	Fiber Tracker	11/5/99	11/12/99	-0.9 w
X	First Readout Crate Installed & Working	Silicon Electronics	11/16/99	12/2/99	-2 w
X	SCA Testing Complete	Calorimeter Electronics	11/23/99	12/15/99	-2.8 w
X	MDT ADB Fabrication Complete	Muon Electronics	12/2/99	12/2/99	0 w
X	SLICs Received	Trigger	12/10/99	11/10/99	4 w
X	F Wedge Assemblies 20% Complete	Silicon Tracker	1/24/00	1/19/00	0.4 w
X	6 Chip Ladder Fabrication 20% Complete	Silicon Tracker	1/31/00	1/3/00	3.9 w
X	MDC Fabrication Complete	Muon Electronics	1/31/00	12/13/99	5 w
X	M2-Muon Electronics Preproduction Installation Complete	Muon Electronics	1/31/00	12/13/99	5 w
X	M2-Fiber Tracker Assembly Begun	Fiber Tracker	2/1/00	12/6/99	6.2 w
X	M3-Establish Single Crate Internal Data Movement	Trigger	2/17/00	1/6/00	6 w
X	Shaper Hybrid 50% Complete	Calorimeter Electronics	2/22/00	5/9/00	-11 w
X	All Pixel Octants Assembled	Muon Forward Trigger	2/23/00	4/4/00	-5.8 w
X	M3-1st Forward Preshower Detector Complete	Forward Preshower	2/24/00	1/12/00	6.2 w
X	M3-Fiber Tracker Cylinders 8, 7, 6, and 5 Complete	Fiber Tracker	3/2/00	1/28/00	5 w
	Waveguide Production 50% Complete	Fiber Tracker	3/16/00	1/29/00	6.8 w
X	Steady DAQ Running	Online	3/17/00	3/31/00	-2 w
X	H Half-Wedge Fabrication 80% Complete	Silicon Tracker	3/29/00	2/23/00	5 w
X	M2-All Muon Forward Tracker MDT Modules At Fermilab	Muon Forward Tracker	3/30/00	3/10/00	2.8 w
X	Module Fabrication and Testing Complete	Forward Preshower	4/1/00	12/10/99	14 w
X	M3-2nd Forward Preshower Detector Complete	Forward Preshower	4/3/00	3/8/00	3.6 w
	M3- Cal Readout Available to L2	Trigger	4/5/00	2/11/00	7.6 w
X	FEB, CB Production Complete	Muon Electronics	4/10/00	1/3/00	14 w
X	M3-ICD Tile Modules/Boxes Ready	Intercryostat Detector	4/19/00	1/18/00	13.2 w
	M3-Fiber Tracker Ribbon Fabrication Complete	Fiber Tracker	4/24/00	3/6/00	7.1 w
X	M2-ICD Modules Arrive at Fermilab	Intercryostat Detector	4/24/00	1/25/00	12.8 w
	M3-Level Ø-South Installed	Luminosity Monitor	5/1/00	2/9/00	11.6 w
	Preproduction MTCxx, MTFB, and MTCM Complete	Trigger	5/1/00	1/24/00	14 w
	F Wedge Assemblies 80% Complete	Silicon Tracker	5/3/00	4/26/00	1 w
	M3-InterCryostat Detectors Installed	Intercryostat Detector	5/8/00	2/1/00	13.8 w
	M2-First Silicon Tracker Barrel/Disk Module Complete	Silicon Tracker	5/9/00	1/24/00	15.2 w
	M3-Fiber Tracker Ribbon Mounting Complete	Fiber Tracker	5/15/00	4/20/00	3.5 w
	Alpha Cards Received	Trigger	5/15/00	5/15/00	0 w
	MBTs Received	Trigger	5/18/00	3/16/00	9 w
	MRC, MFC Production Complete	Muon Electronics	5/24/00	3/27/00	8.4 w
	M2-Fiber Tracker Assembly Complete	Fiber Tracker	5/25/00	5/4/00	3.1 w
	SFE, SRC Fabrication Complete	Muon Electronics	5/30/00	2/3/00	16.5 w
	M2-Calorimeter Preamp System Test Complete	Calorimeter Electronics	5/31/00	3/31/00	8.4 w

# DØ Upgrade Monthly Progress Report

for the month of March, 2000

Multichip Modules Received	Fiber Electronics	6/1/00	2/23/00	14 w
M3-VLPC Cassette Assembly 50% Complete	VLPCs	6/5/00	4/12/00	7.4 w
M3-Calorimeter CC, ECN Preamplifier Installation Complete	Calorimeter Electronics	6/7/00	3/31/00	9.4 w
Ten 8-chip Analog Boards Available	Fiber Electronics	6/8/00	4/19/00	7 w
9 Chip Ladder Fabrication 80% Complete	Silicon Tracker	6/27/00	3/27/00	13 w
M3-L3 Operational (One Full Chain)	Trigger	6/29/00	6/1/00	4 w
M3-VLPC Cryo System Operational	VLPCs	7/7/00	6/12/00	3.6 w
6 Chip Ladder Fabrication 80% Complete	Silicon Tracker	7/12/00	3/14/00	16.8 w
B-Layer Octants Assembled	Muon Forward Tracker	7/14/00	4/18/00	12.2 w
All MDT Octants Assembled	Muon Forward Tracker	7/14/00	7/14/00	0 w
M2-Muon End Toroids Installed on Platform	Master	7/17/00	11/15/00	-17 w
Drawers Ready	Intercryostat Detector	7/21/00	12/14/99	29.2 w
Global Installation Complete	Trigger	7/21/00	7/12/00	1.4 w
South Half-Cylinder Complete and Ready to Move to DAB	Silicon Tracker	7/27/00	8/1/00	-0.4 w
L2 Muon Installation Complete	Trigger	7/31/00	7/26/00	0.6 w
M3-Waveguide Production Complete	Fiber Tracker	8/2/00	6/5/00	8.4 w
South H-Disks Ready to Move to DAB	Silicon Tracker	8/4/00	7/3/00	4.6 w
L2 CTT Installation Complete	Trigger	8/7/00	8/9/00	-0.4 w
10 Digital Boards Available	Fiber Electronics	8/11/00	3/22/00	20 w
Timing System Installed	Calorimeter Electronics	8/18/00	8/18/00	0 w
L2 Cal Installation Complete	Trigger	9/5/00	8/21/00	2 w
M3-Muon Level 1 Trigger Preproduction Testing Complete	Trigger	9/20/00	4/18/00	21.6 w
M3-Trigger Level 2 Commissioned	Trigger	10/3/00	9/21/00	1.6 w
Production MTCxx, MTFB, and MTCM Complete	Trigger	10/5/00	6/27/00	14 w
Mixer Boards Ready	Fiber Electronics	10/6/00	6/22/00	14.8 w
M3-VLPC Cassette Assembly Complete	VLPCs	10/13/00	8/22/00	7.4 w
PDT Commissioning Complete	Muon Central	10/17/00	6/9/00	18 w
Daughterboard Vendor Production Complete	Calorimeter Electronics	10/25/00	6/16/00	18.2 w
M3-All Silicon Tracker Barrels/Disks Complete	Silicon Tracker	10/27/00	8/25/00	9 w
North Half-Cylinder Complete and Ready to Move to DAB	Silicon Tracker	10/27/00	9/18/00	6 w
M1-Central Silicon Complete	Silicon Tracker	10/27/00	9/18/00	6 w
M1-Begin Shield Wall Removal/Ready to Roll-in	Master	11/1/00	11/22/00	-3 w
CFA Commissioning Complete	Muon Central	11/1/00	7/10/00	16.3 w
Muon Forward Tracker B-Layer Planes Installed	Muon Forward Tracker	11/2/00	6/15/00	19.6 w
All MDT Planes Installed	Muon Forward Tracker	11/2/00	8/4/00	12.6 w
All Muon Forward Trigger Detector Planes Installed	Muon Forward Trigger	11/27/00	8/25/00	12.6 w
BLS Motherboard Assembly Complete	Calorimeter Electronics	12/1/00	8/7/00	16.2 w
M2-Silicon Tracker Installed in Solenoid/Fiber Tracker	Silicon Tracker	12/19/00	9/25/00	12 w
M2-Calorimeter BLS Assembly Complete	Calorimeter Electronics	1/18/01	9/26/00	15.2 w
M1-Detector Rolled-in and Hooked Up	Master	2/1/01	2/2/01	-0.2 w